CADCO

SYSTEMS

BROADBAND EQUIPMENT

Operating Manual

for the

M-369

Agile Modulator System M/N

2363 Merritt Drive • Garland, Texas 75041
Phone 972-271-3651 • FAX 972-271-3654 • 800-877-2288

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Important Notices

Shipping Loss or Damage
Before signing the Common Carrier's delivery receipt, count the number of cartons and inspect each for visible damage. If the number of cartons does not agree with the receipt or there is damage, make note of these discrepancies on all copies of the receipt before signing.

Immediately unpack the equipment and inspect for concealed damage. If damage is found, notify the carrier immediately. We suggest you keep the shipping carton and packaging material should the equipment ever need to be returned.

After filing you claim, notify CADCO for assistance on repair or replacement disposition.

***CAUTION* – Unauthorized Repair**
Unauthorized repair, modification or disassembly during the warranty period may cancel the warranty. Should field repairs or modifications be desired, CADCO technicians may be able to provide helpful suggestions, saving you both time and money.

Notice of Proprietary Data and Changes
Data, drawings, designs represented and all other material contained herein are the proprietary property of CADCO Systems, Inc., and may not be reproduced or duplicated in any form without written authorization by CADCO Systems, Inc. All material is subject to change without notice or obligation.

Equipment Return
Should you desire to return the equipment for service, please call CADCO prior to shipping. Enclosing as much information as possible on the reason for return and the work desired will expedite service and help to insure your satisfaction. If possible, pack the equipment in the original carton and materials. If the original packaging material is no longer available, pack the equipment in cushioning material sufficient to provide a minimum of 1.5 inches separation between the carton and the equipment. No Return Authorization number is required. Include your return address, telephone number and method of return shipment. Ship the equipment prepaid to the address in this manual.

Reasons for using CADCO Factory Service:

CADCO services exclusively CADCO equipment

Designed and manufactured your CADCO equipment

Knows CADCO equipment better than any other service provider

Technicians are trained on all CURRENT and PAST technical product information

Technicians use specialized testing and alignment tools designed for CADCO equipment

Technicians may often help with a specialized application

Toll-free factory sales and service hotline

Factory service rates are very competitive and in many cases less expensive than non-factory service stations

Guarantees factory service for two years

Is known for fast, friendly customer service

Suggestions for Headend Racking and Maintenance

For prolonged equipment life and operating stability, the following recommendations are made:

- All headends should be installed in an environmentally controlled dust-free room having a nominal temperature of 80°F (26°C) and 60% humidity. The room should be protected from rodents and insect pests.

- All equipment should be mounted in standard equipment racks or cabinets

- All equipment should be rack spaced at one panel height, 1.75 inches (4.44cm). There should be nothing between the equipment preventing air circulation.

- Please make certain headend wiring and current capacity has adequate safety margins. Never cascade AC powering strips. Use separate outlets. If AC power is subject to fluctuation we recommend a constant voltage transformer be used. Beware of ground loops and be certain all wiring is bonded and properly grounded. Consult a code book as needed.

- All equipment racks should be electrically bonded together and earth grounded

- All equipment interconnecting RF cables should be a minimum of double shielded and quad shielded is recommended. Poorly shielded cable causes cross-modulation picture degradation between equipment.

- Always use the coax connector intended for the coaxial cable used. Be certain it is installed as recommended by the manufacturer. Connectors should be RFI shielded.

- RF Input and RF Output cables should be on opposite sides of the equipment rack. Never bundle input and output RF cables together.

- Operate each modulator and processor at the RF output level recommended. If it is necessary to reduce the RF Output level, always operate the equipment as recommended and reduce the RF

- Equipment RF test points are only relative indicators of the actual RF output level. All RF operating level measurements should be made at the RF Output of each unit.

- When the headend is initially placed in service, create a record of all operating parameters for each channel's equipment. Referring to these records during routine maintenance provides a helpful record of operating changes.

M369 Agile Modulator

FEATURES

- Totally Microprocessor Controlled with Self-Diagnostic Monitoring
- Selectable Output Channels
  - Standard Cable Channels T7 through 118 (7MHz – 756MHz)
  - HRC Channels 1 through 118
  - Automatic +/- 12.5KHz or +/- 25.0 KHz FCC Offsets
- SAW Filtered IF Designed for Adjacent Channel Operation
- +60dBmV Output Using Low-Distortion Hybrid Amplifiers
- Non-Volatile Channel Selection
- Synthesized Oscillators – Crystal Referenced Phase Locked
- Bar Graph Modulation and Digital LED Readout
- Internal Switch Selects Standard or HRC Output
- Surface Mount Technology Construction
- RF Muted During Tuning
- Phase Lock Loop FM Audio
- BTSC Stereo Compatible
- External Separate Audio/Video and Composite IF Loop-Through
- Sound Carrier Level Adjustable –10dB to –20dB
- Video Delay Predistortion Network Meets FCC 73.687
- Non-Volatile Memory Retains Channel After Power Loss

AVAILABLE OPTIONS

- 4.5 MHz Subcarrier and Baseband Audio Inputs

- Dual RS-232 Control with Daisy Chain Capabilities which allows for remote control by PC workstation

HRC Output Frequency Set

All CADCO frequency agile products may be set for HRC frequency output. This feature is controlled by an internal dip switch assembly, DS-1. The switch is located near the right front corner (with the front panel facing you) between the test point and the output converter module. DS-1 is clearly marked on the PCB. Switch #3 placed in the 'OFF' position switches the output frequency to HRC on all channels. The switch is normally set to 'ON' at the factory.

Operating Instructions

Model M369 Agile Modulator

INTRODUCTION
CADCO thanks you for purchasing the M369 Agile Modulator. The M369 contains the latest in CATV electronics, including Synthesized Crystal Referenced Phase Locked Oscillators, SAW filtered IF, Hybrid Amplifiers and Microprocessor Control.

SETUP AND OPERATION
The M369 Agile Modulator has a composite external rear panel IF Loop for use in scrambling of IF program switching. This combined IF Loop carries the Video IF Carrier at 37dBmV +/- 2dBmV and the Audio IF Carrier at a level set under "A/V Ratio" to the output upconverter where the SAW filter is located. The M369 also has separate AUDIO and VIDEO IF loops at 40dBmV +/- 2dBmV. If an external alternate IF source is not used, the RG-59 jumpers must be connected. Any loss through an alternate IF source will result in lower RF output.

M369 Agile Modulator

- Connect to a proper AC electrical source as indicated on the back of the unit. Observe the front panel Display Window while power is applied; all elements of the displays will be turned on momentarily as a display test. The following numbers displayed after the LED test will be the microprocessor software version, the internal option dip switch settings and finally the last frequency tuned. After a moment, the Lock Detect LED will illuminate. The unit is now ready for operation.

- The desired output channel of operation is selected by the front panel CHANNEL SELECT toggle switch. If you require a channel other than the one currently displayed, move the toggle switch up or down to cycle through the channels until the channel you are selecting is displayed. To prevent accidental channel changing, the toggle switch must be held up or down for a few seconds before actual channel switching will occur. It is normal for the FREQUENCY LOCK LED to be off during and for a few seconds after changing channels. The RF OUTPUT is muted when the FREQUENCY LOCK LED is off. This insures that existing channels on the cable system are not interfered with during the channel selection process. FCC offsets (US Versions) are microprocessor controlled and fully automatic for both Standard and HRC Channels.

- Connect a 1.0 Volt peak-to-peak video source to the rear panel 'Video In' connector. Using a Field Strength Meter or Spectrum Analyzer connected to the rear panel RF OUTPUT connector, adjust the front panel OUTPUT LEVEL control to the desired level. The recommended output level is between +55dBmV (+115dBuV) and +60dBmV (+120dBuV).

- Adjust the front panel VIDEO MODULATION control for 87.5%. This can be observed on a monitoring TV receiver.

- The M369 will accept either Baseband or 4.5 MHz Subcarrier audio input. Be certain the rear panel audio selector switch is in the proper position for whichever input you select. The Baseband input is connected to the rear panel audio terminal strip using the left and right terminal for balanced input. For unbalanced use the left and center terminals. The center terminal is chassis ground. The 4.5MHz Subcarrier audio input is connected through the F-type coaxial connector.

- While audio is being fed to the M369, adjust the front panel AURAL CARRIER LEVEL control while observing the channel audio carrier frequency on a Field Strength Meter or Spectrum Analyzer. Usually the preferred audio carrier level is 13 to 17dB below the video carrier level.

- Set the front panel AUDIO DEVIATION control for +/- 25KHz peak deviation, the approximation of which can be determined by listening to a TV receiver and setting the loudness equal to that of and off-air channel carried on your system.

- To operate T-Channels, use the OUTPUT CHANNEL SELECT switch and scroll through the channel until you are above channel 118 or below channel 2. This will move you into the "T" Band and will be indicated by a "-" on the far left side of the LED display. Once you leave the "T" band, the "-" will disappear.

  Example: Channel T8 is indicated by - 8

IMPORTANT

CADCO power supplies are designed so that under certain power line or heat buildup conditions the unit shuts off. An indicator would be no RF output, but the POWR LED remains on. If this occurs, unplug the power cord and wait two minutes before re-powering. Upon applying power, you should again have RF output. If not, or should the unit return to shutdown mode, please contact CADCO or your Distributor for assistance. CADCO highly recommends a 1.75 inch air circulation space between any rack mounted equipment.